

### Special Problem 3.7-1

Indicate your answers by circling the correct answers. No justification is required.

Which **two** of the reasons given below are primarily responsible for the formation of the barrier voltage across a  $p$ - $n$  junction?

- A) Holes from the  $p$ -type silicon diffuse across the junction, leaving negative ions uncovered.
- B) Free electrons from the  $p$ -type silicon diffuse across the junction, leaving negative ions uncovered.
- C) Free electrons from the  $n$ -type silicon diffuse across the junction, leaving negative ions uncovered.
- D) Free electrons from the  $n$ -type silicon diffuse across the junction, leaving positive ions uncovered.
- E) Holes from the  $n$ -type silicon diffuse across the junction, leaving negative ions uncovered.
- F) Holes from the  $n$ -type silicon diffuse across the junction, leaving positive ions uncovered.

Which of the following statements (i.e., there **may** be more than one) are true about drift current ?

- A) It increases as the barrier voltage increases.
- B) It decreases as the barrier voltage increases.

- C) It is not affected by temperature.
- D) It is due to carriers reacting to an applied electric field.
- E) It is due to carries in regions of high concentration moving toward regions of low concentration.
- F) Is in the same direction as the diffusion current for a *pn* junction.